Case Study: Lessons from the National University of Singapore's Self-Service Customization Project

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In This Session ...

- Overview of NUS HR and Finance Systems
- Develop a fundamental understanding of enhancement framework in order to enhance / adapt self-service application
- Uncover the potential of what can be achieved with the enhancements within the framework and Web Dynpro ABAP
- Learn how NUS applied the techniques to some of the in-house projects
- Share lessons learnt in implementing and enhancing in-house ESS projects including best practices, tips, and pitfalls to watch out for

What We'll Cover ...

- Overview of NUS Finance Systems
- Enhancement Options in Finance Systems
- Evolution of SAP ERP HCM and ESS at NUS
- Understanding the building blocks
- Example of how we applied Enhancement Framework
- Post upgrade adjustment
- Lessons learnt
- Wrap-up

NUS Finance System - Overview

**** NUS uses SAP since 1992**

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Enhancement Options in Finance Systems

Standard Enhancement Options:

- FI Validations – OB28
  - Eg - Validation of posted amount for a document type
  - 3 levels – Header, Item, Complete document
- FI Substitutions – OBBH
  - Eg - Setting payment block indicator for certain exceptions
  - 3 levels – Header, Item, Complete document
- Business Transaction Events – FIBF
  - Eg - SAMPLE_PROCESS_00001120 used for substituting FI document fields for any documents posted from integrating modules like MM, SD etc.
- Message Controls - OBA5
  - Eg – Change warning message to error message when exchange gain/loss tolerance is exceeded
  - 2 options – For online transactions and batch postings

Enhancement Options in Finance Systems (Contd…)

Standard Enhancement Options:

- Business Add-Ins (BADI) – SE19
  - Eg - TRIP_POST_FI used for adjusting account determination while posting travel expenses to financials
- SAP Enhancements – CMOD/SMOD
  - Eg - SAPMF02K used for user exits during vendor master creation
  - Options – Screen exit and function exit
- Explicit Enhancement
  - Option to replace SAP source code without modification
  - Can be applied to any part of the source code
- Implicit Enhancement
  - Option to enhance interfaces of SAP function modules, attributes and methods of ABAP Classes.
- Transaction Variants – SHD0
  - Eg – Disable changes to one-time vendor / customer name

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History (SAP and SAP ERP HCM at NUS)

- 1992: SAP R/2 on mainframe – Financial modules
- 1994: First in Asia to migrate to SAP R/3 – Financial modules

Period	HCM Modules	Platform
2001	Personnel Administration (PA) Organization Management (OM) Payroll (PY) Funds and Position Management (FPM)	R/3 4.6C
2004	Time Management (TM)	
2005	Training and Event Management (TEM)	
2006	Objective Settings Appraisal (OSA)	NW 2004, ERP 2004
2008	Travel Management (TV)	NW 7.0, ERP 6.0 (EHP2)
2009 and beyond	More On – Objective Settings Appraisal (OSA)	NW 7.0 ERP 6.0 (EHP2)

- 2010 : NW 7.0.1 ERP 6.0 (EHP4)

History (ESS at NUS)

Period	ESS	Web UI Technology	Platform
2001	• Update address & contact • Update office contact • Payslip	ITS – BusinessHTML ITS – BusinessHTML	SAP R/3 4.6C ITS 6.10, then ITS 6.20
2004	• Leave • TEM • Custom reports	ITS – BusinessHTML ITS – BusinessHTML Webrfc	
2006	• OSA – use for staff to declare "Conflict of Interest" • Launch a custom eService on Official Leave application developed using BusinessHTML	BSP HTMLB ITS – BusinessHTML	NW 2004, ERP 2004, ITS 6.20 (Not utilizing Integrated ITS)
2007	OSA – use for staff to declare housing benefits and allowances	BSP HTMLB	
2008	• Travel Management (Web Dynpro ABAP) • OSA – Appraisal • Leave • TEM • Custom reports	Web Dynpro ABAP BSP HTMLB ITS – BusinessHTML ITS – BusinessHTML BSP	NW 7.0, ERP 6.0 (EhP 2), Integrated ITS
2009 and beyond	• OSA – Appraisal: Extend to larger group of staff • Custom reports	BSP HTMLB Web Dynpro ABAP	2010 : NW 7.0.1 ERP 6.0 (Ehp 4), Integrated ITS

Enhancement Options (In the Past ...)

ESS	WEB UI Technology	Options
TM (Leave)/ TEM	ITS based	• IMG • Modifications • Copy the standard and make modifications
OSA	BSP HTMLB	• Via PHAP_CATALOG_PA • Copy the standard BSP, HAP_DOCUMENT and make modifications

Decision Point: Disadvantages
"Impossible" to cope with fixes released by SAP
Massive testing after each application of support package (SP) or upgrade
New features introduced with the ESS cannot be readily benefited

Web Dynpro ABAP vs. Web Dynpro Java

Considerations

1. Skill-sets: ABAP or Java developers
2. Tool or development environment familiarity

} Training, learning curve and time-to-productivity

Decision Point

3. Business logic – residing in SAP R/3 rather than Java (e.g., EJB) ➡ native ABAP calls vs. adaptive Remote Function Call (RFC)

4. Infrastructure: In-place vs. new extensive Dev/QA/Prod for SAP NetWeaver® Development Infrastructure (NWDI) ➡ cost

5. Enhancement framework only applicable in ABAP world

Heads-Up

6. Desired features: List viewer and richness of library functions such as value help, SAP List Viewer (ALV) etc., readily available

7. Insider News … MSS moving to Web Dynpro ABAP, newer functionalities in ESS will be delivered in Web Dynpro ABAP. *(Example: eRecruitment, Enterprise Learning, Objective Settings Appraisal, Enterprise Compensation management, Travel Management, Forms & Processes and soon, Leave, etc.)*

8. Stability: *Web Dynpro for Java has improved over the years with more robust java virtual machine (JVM)*

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Example of What's Achievable with Enhancement Framework

- Add new UI element/hide existing UI/view element on your Web Dynpro ABAP ESS
- Change the label and introduce a tool-tip for each UI/view element on your Web Dynpro for ABAP ESS
- Alter the processing logic of the standard delivered business logic – function module, routine, class, etc.
- Incorporate additional authorization check on top of the standard
- Introduce new business functionality
- …

Without modifications, beyond customizing via IMG

Building Blocks

User Interface: Web Dynpro ABAP (WD4A):
- Fundamentals
- What can be enhanced?
- Techniques

Building Blocks

Enhancement Framework:
- Business/application logic
    - What can be enhanced?
    - Techniques

Switches:
- Turn on/off an enhancement

Enhancements: Then and Now ...

Prior to NW 7.0 :

- IMG
- Append structure / CI include
- User exit
- Customer exit
- BADI (classic)
- Transaction variant

With NW 7.0 and onwards - Enhancement Framework

Business functions (delivered in classes, function modules, routines etc.) utilizing implicit and explicit enhancement and new BADI

User Interface with enhancement within Web Dynpro ABAP

Overview: Enhancement Framework and Switch

- What is so special?
  - Enhancements are never overwritten in an upgrade: They are objects in your own (customer) namespace
  - In an upgrade, all SAP objects are replaced whether they have been changed or not
    - But customer enhancements survive an upgrade as the changes are “stored” in their own customer namespace
  - Enhancements may be “reversible”
    - You can deactivate Business Functions and switch off the Enhancements assigned to switchable packages that are dependent on these Business Functions as of SAP NetWeaver 7.00 SP14, which is available for all SAP ERP 6.00 customers

Heads-Up

Overview: Enhancement Framework — Differences

	Implicit	Explicit
Difference	• Available automatically, at common enhancement places • Does not require enhancement spots	• Pre-defined by SAP developer • Stored/contained (managed) in enhancement spots
	Beginning/End of: • Include • Method • Function module • Form routine	Enhancement-Point • Allowing multiple active implementation by order of execution is not pre-defined/guaranteed Enhancement-Section • Only one active implementation
Others	• Additional (optional) interface parameters in SAP function modules and SAP methods • Additional attributes and methods in SAP classes • Pre-exit, overwrite and post exit of SAP global methods	New BAdI

Class/Interface: Exits

Note

Exits	Notes
Pre-exit	Called at the beginning of the method Example: You may want to influence the variable value used in the method call prior to the execution of the standard method
Post-exit	Called at the end of the method Example: Verifies the value and takes action before the standard method actually terminates
Overwrite-exit	Replaces the original method

Tip

It is better to enhance a public method than a private method

WD4A Enhancement Framework — What and How?

What can be enhanced?

- UI elements: Add a new view element or hide existing view element
- Pre- , post- and overwrite methods of Web Dynpro methods
- New view (as of SAP NetWeaver 7.0 >= SP13)
- New methods
- New navigation paths (plugs)
- New actions
- New context attributes
- New context nodes

How?

- Open in “Display” mode
- Click
- Create new implementation or reuse existing one

Limitations ...

- What is still not possible in SAP NetWeaver 7.0?
  - Create new custom controllers
  - Create a new event in existing controllers
  - Enhance component interfaces

WD4A: Implicit vs. Explicit Configuration

Implicit Configuration	Explicit Configuration
Modifies the properties of a UI (such as visibility, label, tooltip) which was set at design time by the developer	Possible to influence the appearance and behavior of a Web Dynpro (ABAP) component, through additional attributes in the context of a special custom controller (one per component – set as configuration controller)
No programming effort required	The node is mapped to the context of the other controllers. The processing of the attributes can be explicitly programmed.

Heads-Up

Explicit Configuration is still not fully supported for the standard, pre-delivered SAP Web Dynpro ABAP application! The moment you introduce a new custom controller, it is considered a modification.

WD4A: Implicit Customizing/Personalization

- Implicit customizing/personalization
  - Appended with query string, sap-config-mode=X
    - Example: https://...../wd_appl?sap-config-mode=X
  - Authorization object S_WDR_P13N
  - Reserved for application developer or administrator
- User personalization (implicit personalization) can be disabled:
  - In Web Dynpro ABAP, set the parameter: WDDISABLEUSERPERSONALIZATION

Tip

Example : Implicit Customizing / Personalization

sap-config-mode=X

1. Context menu for UI element

2. Set visibility, tooltip, label, etc.

3. Upon "Save and Close," it is possible to transport the configuration

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Example : Add New UI Element and Alter Standard Code

Spot the differences:

- Labeling
- New UI elements:
  - Buttons
    - Important notes
  - Input fields:
    - Approver
    - Funding
    - AM/PM

Demo Time …

- Some examples of how we perform the following:
  - Introduce new view element
  - Modify existing logic to show/hide new view element
  - Implicit customization/personalization
  - Switch

Demo

Options to Consider ...

Priority 1

- Exhaust standard customizing options available :
  - IMG
  - BADI
  - Customer Exit, User Exit ...

Priority 2

- Use Explicit Enhancments
  - New BADI, enhancement section, enhancement point

Priority 3

- Use Implicit Enhancements

Priority 4

- Modifications

Best Practice

Best Practices

- Enhancements are preferred – both enhancement framework and the classic ones – such as, old BAdI, customer exit, data dictionary append, etc.
- Choose enhancement types that are more stable, for example, explicit enhancement over implicit enhancement, enhancement to public methods of public class over private method
- For modifications, you may also consider introducing your own explicit enhancement point/section or new BAdI
- Prefer switchable enhancements:
  - You can make classic enhancement switchable
  - You can make your modification switchable
- To avoid naming conflicts (e.g., during upgrade, patch), create new objects within WD4A enhancement in customer name space (e.g., Y*, Z*)

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Upgrade Adjustment

- Why is it necessary?
  - Name conflict
  - An enhanced method/routine deleted or modified, etc.
- Invoke transaction SPAU_ENH
  - Double click on the enhancement implementation you want to adjust
  - Switch to Change mode
  - Go to Adjustment tab
  - Make the adjustment(s) necessary

    - Hint: Use splitscreen editor
  - Set adjustment status to
  - Press Adjust Enhancement Implementation
  - Activate enhancement

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Lessons Learnt: Project Management

- Automate a refined and lean process: Simplicity is key
  - Acknowledge the importance and make effort/time for it! Not just lip service.
  - Simplicity techniques – removal (with or without replacement), combine, restructure/repackage
- Plan for your critical skill-sets required for the project
- Ensure buy-in from top management. Engage them and keep them in the loop.
- Engage users early, it's never too early to engage them
- Pilot before major rollout

Lesson

Lessons Learnt: Others

- Delegation function – know the "culture" of your users
- Browser support for Web Dynpro for ABAP: Do not forget Mac users

OS	IE7	IE8	Firefox 3.0	Firefox 3.5
XP	NW 7.0: SP15	NW 7.0: SP20 NW 7.0 EhP1: SP5	NW 7.0: SP19 NW 7.0 EhP1: SP5	NW 7.0: SP21 NW 7.0 EhP1: SP6
Vista	NW 7.0: SP15	NW 7.0: SP20 NW 7.0 EhP1: SP5	NW 7.0: SP19 NW 7.0 EhP1: SP5	NW 7.0: SP21 NW 7.0 EhP1: SP6
Mas OS 10.X	No	No	NW 7.0: SP19 NW 7.0 EhP1: SP5	NW 7.0: SP21 NW 7.0 EhP1: SP6

- Source
  - https://service.sap.com/pam *
  - https://websmp202.sap-ag.de/~sapidb/011000358700000294692004E *
  - http://service.sap.com/~sapidb/011000358700001936242005E#9 * (Page 9-12)

Lesson

* Requires login credentials to the SAP Service Marketplace

Skill Set Required

- Composition of a strong project team:
  - Project Manager – experience plus PMI certification
  - Quality Manager – trained in ISO 9001:2000
  - Business Process Improvement – Lean Six Sigma (at least Green Belt)
  - Supporting team members:
    - Techo-functional consultant(s):
      - *Functional and technical skills (covering Web Dynpro ABAP, Enhancement Framework, Workflow, and ABAP OO)*
      - *Minimum Web Dynpro ABAP SAP training: NET310*
      - *Minimum Enhancement Framework SAP Training: BC427*
      - *Certification … (a bonus) www.sap.com/services/education/certification*
    - Work closely with BASIS, Security and Network team

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Resources

- SAP Note 1257033 – Cookbook: Modification/Enhancement for Standard SAP System
  - https://websmp230.sap-ag.de/sap(bD1lbiZjPTAwMQ==) /bc/bsp/spn /sapnotes/index2.htm?numm=1257033 *
- How to Get the Most From the Enhancement and Switch Framework as a Customer – Tips from the Experts
  - www.sdn.sap.com/irj/scn/weblogs?blog=/pub/wlg/12225
- ABAP Enhancement and Modifications
  - www.sdn.sap.com/irj/sdn/nw-development?rid=/webcontent/ uuid/2342e1f3-0b01-0010-a186-fdd404884050
- Web Dynpro for ABAP – Customization and Personalization
  - www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/webcontent/uuid/90c63438-3dad-2910-b0b5-95ddafb566e3
- Ulli Hoffmann, *Web Dynpro for ABAP* (SAP PRESS, 2006).

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7 Key Points to Take Home

- Simplify the scope and processes before embarking on a project
- Find and exhaust all standard options such as IMG, BAdI, customer exits, etc. before considering Enhancement Framework
  - Use Enhancement Framework only when necessary, and in moderation
- Enhancements are special because they are never overwritten in an upgrade: They are objects in your own (customer) namespace
- Utilize the more "stable" enhancements first
  - For explicit enhancements, use transaction SE84 to find enhancement spots
- Utilize switch (even for modifications) to turn on/off the changes
  - Very handy when it comes to troubleshooting and support
- Remember – Enhancement Framework does <u>not</u> equate to no post-upgrade activities
- Be resourceful and make time for it

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